

CLAIM AMENDMENTS

1. (currently amended) An apparatus for detecting leaks in a liquid storage tank comprising:

differential pressure sensor means having a low pressure measurement component and a high pressure measurement component;
protective enclosure means for protecting said differential pressure sensor means from materials and conditions when immersed in liquid contents of said storage tank;

said high pressure measurement component being configured for measuring tank bottom pressure within a liquid in which said canister is immersed;
said low pressure measurement component being configured for receiving data indicative of atmospheric pressure substantially at the surface of said liquid;

barometric pressure measuring means configured for measuring atmospheric pressure substantially at the surface of said liquid when said protective enclosure means is immersed therein;

barometric pressure and differential pressure calculation means configured for receiving first and second data reflecting, respectively, said tank bottom pressure and of said barometric pressure substantially at said surface of said liquid, and for adjusting said first data to substantially eliminate variations upon said measurements of said tank bottom pressure caused solely from atmospheric pressure variations to yield an atmospheric pressure adjusted tank bottom pressure;

ambient temperature measurement means for measuring ambient temperature near said storage tank;

tank dynamic and barometric pressure adjusted tank bottom pressure calculation means configured for receiving third data indicative of said atmospheric pressure adjusted tank bottom pressure, for receiving fourth data indicative of ambient temperature measurements by said ambient temperature measurement means, for receiving fifth data indicative of expansion characteristics of said storage tank, and for adjusting said third data with reference to said fourth and fifth data to substantially eliminate variations upon measurements and calculations of said barometric pressure adjusted tank bottom pressure, caused solely by dimensional changes in said storage tank resulting from atmospheric temperature variations, to yield a tank dynamic adjusted tank bottom pressure; and tank content mass calculation means for calculating mass contents of said storage tank substantially based on said tank dynamic adjusted tank bottom pressure and user input data reflecting physical characteristics of said contents of said storage tank.

2. (currently amended) The apparatus of Claim 1 wherein said protective enclosure means is configured for maintaining at least some components of said apparatus ~~within said canister~~, including said differential pressure sensor, but excepting said low pressure measurement component and said high pressure measurement component, in a substantial vacuum.

3. (original) The apparatus of Claim 1 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

4. (original) The apparatus of Claim 2 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

5. (currently amended) An apparatus for detecting leaks in a liquid storage tank comprising:

differential pressure sensor means having a low pressure measurement component and a high pressure measurement component;
protective enclosure means for protecting said differential pressure sensor means from materials and conditions when immersed in liquid contents of said storage tank;

said high pressure measurement component being configured for measuring tank bottom pressure within a liquid in which said ~~canister~~ differential pressure sensor means is immersed;

said low pressure measurement component being configured for receiving data indicative of atmospheric pressure substantially at the surface of said liquid;

first barometric pressure measuring means configured for measuring atmospheric pressure substantially at the surface of said liquid when said protective enclosure means is immersed therein and for communicating such measurement to said low side pressure measurement component of said differential pressure sensor;

second barometric pressure measuring means configured for measuring atmospheric pressure substantially at the surface of said liquid when said protective enclosure means is immersed therein;

barometric pressure and differential pressure calculation means configured for receiving first and second data reflecting, respectively, said tank bottom pressure and of said barometric pressure as measured by said first

barometric pressure measuring means and for calculating pressure attributable to liquid content of said storage tank, and receiving third data from said second barometric measuring means and, based thereon, adjusting said pressure attributable to said contents of said storage tank to substantially eliminate variations upon said measurements thereof caused solely from atmospheric pressure variations to yield an atmospheric pressure adjusted tank bottom pressure;

ambient temperature measurement means for measuring ambient temperature near said storage tank;

tank dynamic and barometric pressure adjusted tank bottom pressure calculation means configured for receiving fourth data indicative of said atmospheric pressure adjusted tank bottom pressure, for receiving fifth data indicative of ambient temperature measurements by said ambient temperature measurement means, for receiving sixth data indicative of expansion characteristics of said storage tank, and for adjusting said fourth data with reference to said fifth and sixth data to substantially eliminate variations upon measurements and calculations of said barometric pressure adjusted tank bottom pressure, caused solely by dimensional changes in said storage tank resulting from atmospheric temperature variations, to yield a tank dynamic adjusted tank bottom pressure; and

tank content mass calculation means for calculating mass contents of said storage tank substantially based on said tank dynamic adjusted tank bottom pressure and user input data reflecting physical characteristics of said contents of said storage tank.

6. (original) The apparatus of Claim 5 wherein said protective enclosure means is configured for maintaining at least some components of said apparatus within

said canister, including said differential pressure sensor, but excepting said low pressure measurement component and said high pressure measurement component, in a substantial vacuum.

7. (original) The apparatus of Claim 5 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

8. (original) The apparatus of Claim 6 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

9. (currently amended) A method for detecting leaks in a storage-receptacle tank; comprising the steps of:

selecting a mass detection system comprising:

differential pressure sensor means having a low pressure measurement component and a high pressure measurement component;

protective enclosure means for protecting said differential pressure sensor means from materials and conditions when immersed in liquid contents of said storage tank;

said high pressure measurement component being configured for tank bottom pressure within a liquid in which said ~~canister~~ differential pressure sensor means is immersed;

said low pressure measurement component being configured for receiving data indicative of atmospheric pressure substantially at the surface of said liquid;

barometric pressure measuring means configured for measuring atmospheric pressure substantially at the surface of said liquid when said protective enclosure means is immersed therein;

barometric pressure and differential pressure calculation means configured for receiving first and second data reflecting, respectively, tank bottom pressure and of said barometric pressure substantially at said surface of said liquid, and for adjusting said first data to substantially eliminate variations upon said measurements of said tank bottom pressure caused solely from atmospheric pressure variations to yield an atmospheric pressure adjusted tank bottom pressure;

ambient temperature measurement means for measuring ambient temperature near said storage tank;

tank dynamic and barometric pressure adjusted tank bottom pressure calculation means configured for receiving third data indicative of said atmospheric pressure adjusted tank bottom pressure, for receiving fourth data indicative of ambient temperature measurements by said ambient temperature measurement means, for receiving fifth data indicative of expansion characteristics of said storage tank, and for adjusting said third data with reference to said fourth and fifth data to substantially eliminate variations upon measurements and calculations of said barometric pressure adjusted tank bottom pressure, caused solely by dimensional changes in said storage tank resulting from atmospheric temperature variations, to yield a tank dynamic adjusted tank bottom pressure; and

tank content mass calculation means for calculating mass content data representative of the contents of said storage tank substantially based on said tank dynamic adjusted tank bottom pressure and user input data reflecting physical characteristics of said contents of said storage tank;

selecting data storage means for collecting a plurality of mass content data as generated by said tank content mass calculation means over a plurality of points in time;

selecting computing means configured for generating a human perceptible indicating of changes in said mass content data between a plurality of said points in time;

placing said protective enclosure means substantially at a bottom interior surface of said storage tank;

actuating said mass detection system; and

observing data indicative of changes in said mass content data attributable to leakage of said storage tank to detect of such leakage.

10. (original) The method of Claim 9 further comprising the steps of:
- securing all input and outflow orifices of said storage tank before said actuation of said mass detection system; and
- substantially selectively processing said mass content data which were generated approximately between sunset and sunrise at an installation site of said system.

11. (currently amended) The ~~apparatus~~ method of Claim 9 wherein said protective enclosure means is configured for maintaining at least some components of said ~~apparatus~~ system ~~within said canister~~, including said differential pressure sensor

means, but excepting said low pressure measurement component and said high pressure measurement component, in a substantial vacuum.

12. (currently amended) The apparatus method of Claim 10 wherein said protective enclosure means is configured for maintaining at least some components of said apparatus system ~~within said canister~~, including said differential pressure sensor means, but excepting said low pressure measurement component and said high pressure measurement component, in a substantial vacuum.

13. (currently amended) The apparatus method of Claim 9 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

14. (currently amended) The apparatus method of Claim 11 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

15. (currently amended) The apparatus method of Claim 12 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

16. (currently amended) A method for detecting leaks in a storage receptacle tank; comprising the steps of

selecting a mass detection system comprising:

differential pressure sensor means having a low pressure measurement component and a high pressure measurement component;

protective enclosure means for protecting said differential pressure sensor means from materials and conditions when immersed in liquid contents of said storage tank;

said high pressure measurement component being configured for measuring tank bottom pressure within a liquid in which said canister differential pressure sensor means is immersed;

said low pressure measurement component being configured for receiving data indicative of atmospheric pressure substantially at the surface of said liquid;

first barometric pressure measuring means configured for measuring atmospheric pressure substantially at the surface of said liquid when said protective enclosure means is immersed therein and for communicating such measurement to said low side pressure measurement component of said differential pressure sensor means;

second barometric pressure measuring means configured for measuring atmospheric pressure substantially at the surface of said liquid when said protective enclosure means is immersed therein;

barometric pressure and differential pressure calculation means configured for receiving first and second data reflecting, respectively, said tank bottom pressure and of said barometric pressure as measured by said first barometric pressure measuring means and for calculating pressure attributable to liquid content of said storage tank, and receiving third data from said second barometric measuring means and, based thereon, adjusting said pressure attributable to said contents of said storage tank to substantially eliminate variations upon said measurements thereof

caused solely from atmospheric pressure variations to yield an atmospheric pressure adjusted tank bottom pressure;

ambient temperature measurement means for measuring ambient temperature near said storage tank;

tank dynamic and barometric pressure adjusted tank bottom pressure calculation means configured for receiving fourth data indicative of said atmospheric pressure adjusted tank bottom pressure, for receiving fifth data indicative of ambient temperature measurements by said ambient temperature measurement means, for receiving sixth data indicative of expansion characteristics of said storage tank, and for adjusting said fourth data with reference to said fifth and sixth data to substantially eliminate variations upon measurements and calculations of said barometric pressure adjusted tank bottom pressure, caused solely by dimensional changes in said storage tank resulting from atmospheric temperature variations, to yield a tank dynamic adjusted tank bottom pressure; and

tank content mass calculation means for calculating mass contents of said storage tank substantially based on said tank dynamic adjusted tank bottom pressure and user input data reflecting physical characteristics of said contents of said storage tank;

selecting data storage means for collecting a plurality of mass content data as generated by said tank content mass calculation means over a plurality of points in time;

selecting computing means configured for generating a human perceptible indicating of changes in said mass content data between a plurality of said points in time;

placing said protective enclosure means substantially at a bottom interior surface of said storage tank;
actuating said mass detection system; and
observing data indicative of changes in said mass content data attributable to leakage of said storage tank to detect of such leakage.

17. (original) The method of Claim 16 further comprising the steps of:
securing all input and outflow orifices of said storage tank before said actuation of said mass detection system; and
substantially selectively processing said mass content data which were generated approximately between sunset and sunrise at an installation site of said system.

18. (currently amended) The ~~apparatus~~ method of Claim 16 wherein said protective enclosure means is configured for maintaining at least some components of said ~~apparatus~~ system within said canister, including said differential pressure sensor means, but excepting said low pressure measurement component and said high pressure measurement component, in a substantial vacuum.

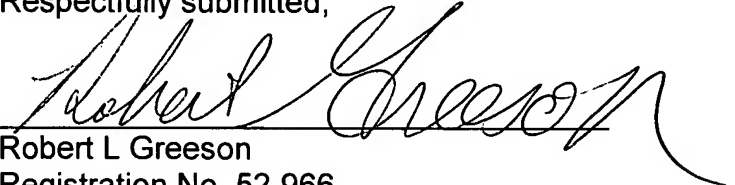
19. (currently amended) The ~~apparatus~~ method of Claim 17 wherein said protective enclosure means is configured for maintaining at least some components of said ~~apparatus~~ system within said canister, including said differential pressure sensor means, but excepting said low pressure measurement component and said high pressure measurement component, in a substantial vacuum.

20. (currently amended) The apparatus method of Claim 16 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

21. (currently amended) The apparatus method of Claim 17 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

22. (currently amended) The apparatus method of Claim 18 further comprising protective enclosure temperature management means configured for maintaining the temperature of said protective enclosure substantially at a user-specified temperature.

Respectfully submitted,

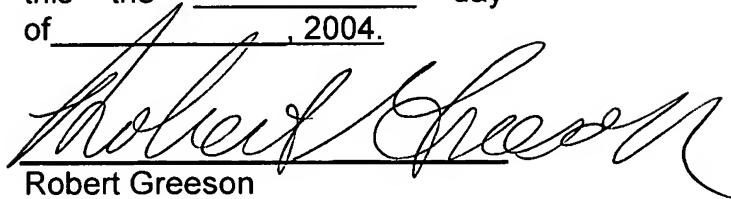


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